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LEGAL & REGULATORY AFFAIRS

September 11, 1995

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M. Street, N.W., Room 222
Washington, DC 20554

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SEP 29 1995

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

RE: Public Comments on Proposed Rulemaking
CC Docket No. 95-116, RM 8525

DOCKET FILE COPY ORIGINAL

Dear Mr. Caton:

So that each Commissioner may receive a personal copy, enclosed are an original and nine (9) copies of COMMENTS OF ITN ON THE TRANSITION TO NATIONAL NUMBER PORTABILITY for filing, pursuant to Paragraph 83 of the NPRM in the above-referenced matter.

I have also filed two copies of the enclosed comments with the Policy and Program Planning Division of the Common Carrier Bureau, and one copy with ITS, Inc.

Sincerely,

Sam LaMartina, Esq.
ITN Legal & Regulatory Affairs
(913) 344-6288

Copy: Mr. Matthew J. Harthun, Esq., Attorney/Advisor
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and, ITS, Inc.

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Telephone Number Portability	)	CC Docket No. 95-116,
	)	Rulemaking No. 8525
	)	

COMMENTS OF ITN ON

THE TRANSITION TO NATIONAL TELEPHONE NUMBER PORTABILITY

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I. INTRODUCTION & SUMMARY

ITN (Independent Telecommunications Network, Inc.) is an Intelligent Network services provider formed by independent telephone companies to serve a national independent community in the provision of SS7 signaling and related services. ITN has grown to serve wireline and wireless service providers of all sizes and types with Intelligent Network (IN) services, including Advanced Intelligent Network (AIN) services. ITN's purpose in filing these comments is to propose an Intelligent Network approach which can achieve a transition to one seamless and interoperable national Telephone Number Portability (TNP) domain.

ITN's proposal assumes that any national TNP solution should (1) minimize the number of unnecessary SS7[1] transactions, (2) avoid impacting non-portable switches, (3) use network resources in the most efficient way possible, (4) allow for the use of current network routing methods, and (5) avoid favoring one service provider over another.

ITN proposes that, to facilitate the economically feasible transition to one seamless national TNP system that fulfills these requirements, national rules should be promulgated based on the following principles: (1) The SCP dip[2] should be performed by the first TNP-equipped ("ported") switch in the call path; (2) A new class mark should be introduced into the SS7 signaling protocol, which indicates that the call has been dipped; (3) The national SCP infrastructure should be based on an infinitely scaleable parsed database structure, which allows

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[1] SS7 stands for Signaling System 7, the industry standard out-of-band signaling protocol (i.e. control and routing messages conducted through a separate SS7 network).

[2] SCP stands for Service Control Point. A dip to an SCP is an SS7 signaling message which queries the SCP for certain data. An SCP is an SS7 control plane network element on which resides service logic (applications software) and other data, and which interacts with other network elements to effect call processing. It is the element on which databases are maintained to provide Advanced Intelligent Network (AIN) capabilities and services.

for highly distributed data management[3]; and (4) Local number portability domains should be consolidated as soon as possible into one national system.

These principles are proposed without making assumptions about the various roles of the incumbent LECs and IXCs, or any other potential service provider. Compared to other proposals, ITN's approach reduces the number of required database dips. This proposal includes features which avoid impacting non-portable switches, use network resources efficiently, and allow for the use of current network routing methods. ITN's distributed control plane database architecture most efficiently allows local TNP implementations to be migrated to a seamless, interoperating national system.

ITN's approach embodies a model that is very much like that successfully deployed in wireless telecommunications today. It contemplates the entry of the expanding field of competitive service providers,[4] whether based on wireline, CMRS[5] (wireless), or both, into one interoperable national TNP domain.

II. TRANSITION TO NATIONAL TELEPHONE NUMBER PORTABILITY

A. Common Requirements For a National Solution

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[3] "Data management" here refers to the processes which comprise the ongoing updates of ported numbers and other customer information to the relevant network elements.

[4] The definition of service provider portability in these comments contemplates these imminent new entrants: the expanding category of CMRS providers, the cable providers, and AIN and other SCP-based service providers, as well as any other worthy competitor whose precise form has yet to be imagined.

[5] "CMRS, or 'Commercial Mobile Radio Services,' is a category of services Congress created to encompass all mobile telecommunications services that are provided for profit and make interconnected service available to the public...[including] cellular mobile telephone service, non-private paging service, SMRs that are interconnected to the PSTN, air-ground service, satellite systems for mobile communications, maritime service, and PCS." Excerpts from FCC's First Annual Status Report on CMRS to Congress.

Compared with the relatively controlled and incremental evolution of the telecommunications industry over the past 100 years, the implementation of TNP challenges some of the basic tenets of the established telecommunications business. For instance, in the past, one could be assured that calls to a directory number having a certain NPA, or "area code", would be terminated within a specific geographic area. With the advent of geographic number portability, the NPA begins to lose geographic significance, just as, for example, a consumer dialing a toll-free 800 number does not know where the call terminates by merely referring to the dialed number.[6] In the past, switches have routed based upon the dialed digits. With geographic number portability, the network will not be able to route on the dialed digits since they no longer have physical association with the location of the called party.

Since the infrastructure associated with number portability will significantly change the way various telecommunications transactions are conducted within the existing network, care must be taken in deploying TNP solutions. ITN proposes that to ensure the efficiency and integrity of the existing infrastructure, as well as to promote a robust and equitable marketplace for competitive service providers, any national TNP solution should satisfy the following common requirements:

- Minimize the number of unnecessary SS7 transactions.
- Avoid impacting non-portable switches.
- Use network resources in the most efficient way possible.
- Allow for the use of current network routing methods.

[6] As with the introduction of 500 Services (more broadly "N00 NXX" services), the Commission will need to address certain attendant issues with geographic number portability. For prime example, who will pay long distance charges generated by calls to "ported" numbers.

- Not favor one service provider over another.
- Allow for seamless transition from various local solutions to one national solution.

In these comments, ITN proposes a TNP solution which minimizes the impact on existing network resources and can be implemented so as to allow for an economical, scaleable transition from various local TNP implementations to one compatible national TNP system.

B. ITN's Proposal

To facilitate the transition to national number portability, while meeting the above objectives, national rules should be promulgated based on the following principles to ensure an efficient, seamless evolution from various local implementations to an interoperable national system: (1) The SCP dip should be performed by the first ported switch in the call path capable of doing so; (2) A new class mark should be introduced into the SS7 signaling protocol, which indicates that the call has been dipped; (3) The national SCP infrastructure should be based on an infinitely scaleable parsed database structure, which allows for highly distributed data management; and (4) Local number portability domains should be consolidated as soon as possible into one national system.

1. Three Stage Implementation.

ITN's proposal may be implemented in three stages.[7]

Stage 1

The first stage allows for immediate deployment of local TNP with minimal changes to the existing infrastructure. Stage 1 requires that each switch, or SSP[8], within a TNP domain be

[7] While staged implementation is feasible as described herein, ITN does not intend to suggest that it is necessarily preferable to contemporaneous national implementation using ITN's approach.

able to query[9] the local SCP via AIN 0.1[10] software, thus enabling the switch as "portable" for purposes of ITN's TNP proposal.

As stated above, TNP should be implemented in such a manner as to use network resources efficiently, and allow for existing routing methods. In order to optimize the use of existing numbering resources, ITN proposes a migration to two types of addresses (i.e., numbers): Virtual Addresses or VAs (also called Customer Network Addresses or CNAs), and Physical Addresses or PAs (also called Network Node Addresses or NNAs). The VA will be the directory number, which the end user will be able to retain and "port" to an indefinite number of PAs.[11] On the other hand, the PA to which a VA is mapped at any given point in time will likely change with some frequency, depending upon the end user's chosen parameters, such as location, preferred service providers, time-of-day, calling party ID, and numerous other user preferences.[12]

In Stage 1, each portable switch recognizes, via its SSP translation tables, the entire ten digit NPA-NXX-XXXX of every number identified as ported. When a dialed number reaches a

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[8] SSP stands for Service Switching Point. An SSP is that part of an end office switch which makes it SS7 capable. The term SSP is often used to refer to the switch itself. The terms "SSP" and "switch" are used interchangeably.

[9] "Query" (commonly referred to as a "dip") means to send an SS7 message, via one or more STPs (Signal Transfer Points) which are SS7 switching elements containing Global Title Translation (GTT) tables for routing to and from other SS7 network elements, for prime example, SCPs and SSPs. See below Figure 4 and Section II.D entitled "Parsed Database Control Plane Architecture Creates Options in Data Management", for further signaling/control plane explanation.

[10] AIN Release 0.1 is required because it includes the Info_Collected Trigger Detection Point, which ITN's approach requires in all originating switch queries to translate the Physical Address (PA) into the Virtual Address (VA).

[11] The end user customer may then be said to have certain ownership rights in a given directory number, insofar as the customer may conceivably have the right to retain the same directory number for a long, possibly indefinite, period of time.

[12] For example, if an end user's cellular phone is "on", the end user's VA would be mapped to the PA of that cellular phone, wherever it is. Alternatively, the VA might be mapped to the PA of a landline phone, voice mail box, facsimile machine, etc.

ported switch, the switch checks, as part of the normal operations during digit translations, to determine whether the called number has been ported.[13] If it has, the SSP queries a local TNP SCP to determine the Physical Address--the PA--of the called customer. If not, the switch routes the call based on the dialed digits.[14]

In order to minimize SS7 dips in Stage 1, the entire set of relevant NPA-NXX-XXXXs is divided into two separate and disjoint subsets: ported numbers and non-ported numbers. Ported numbers are assigned to customers who have changed local service providers, services and/or locations, and which customers choose to keep the same directory number (Virtual Address--the VA). Non-ported numbers are either non-portable numbers (i.e. NXXs associated with non-portable switches), or potentially portable numbers the users of which have not (yet, anyway) chosen to port. Thus, in Stage 1, each switch in the call path distinguishes between ported and non-ported numbers, and therefore whether to dip or not to dip, by translating the entire ten digit NPA-NXX-XXXX. Refer to the Stage 1 Examples which follow.

Stage 1 Example Call Flows

The call flows for this model is presented in Figures 1 & 2 below. In the call flows, Local Service Provider (LSP) 1 and 2 are within the Portable Domain (PD),[15] while LSP 3 is outside of the PD. LSP 3 could connect directly to the PD (as shown) or could be connected via an IXC

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[13] That is, whether an AIN Info_Analyzed trigger detection point is provisioned against the number in a given switch.

[14] Note: As the number of ported numbers grows, this approach may become unmanageable. At that point, the switch could be adjusted to translate the six digit NPA-NXX to decide whether to dip the SCP, although downstream switches may generate redundant queries prior to Stage 2.

[15] Define a Portable Domain (PD) as the set of switching systems which are portable. All of these switches, by definition, have access to the SCP via the SS7 network. When a call is placed within the PD, the originating switch translates the dialed number (VA) to the routing number (PA). Subsequent switching systems in the PD are aware that the number received has been translated since it is a PA, i.e., no AIN trigger has been provisioned against the number.

(not shown). It is assumed that telephone numbers associated with the 212-335 NPA-NXX are portable. In fact, we assume that the 212-335-1234 telephone number has been ported from Local Service Provider 1 (LSP 1) to LSP 2, specifically the number has been ported from LSP1 end office 2 (EO 2) to LSP 2 EO 1.

Virtual Addresses (VAs) and Physical Addresses (PAs)--disjoint sets of numbers in Stage 1--are used in the call flow diagrams to help illustrate the effect local TNP has on call routing and number translations. In the illustrations below, the 212-335-1234 is the ported number and hence represents the VA. It is assumed, for the purposes of illustration, that the PA of this customer is 212-224-4321. Local Service Provider 1 (LSP 1) has been assigned the 335 NXX while LSP 2 is assigned the 224 NXX.

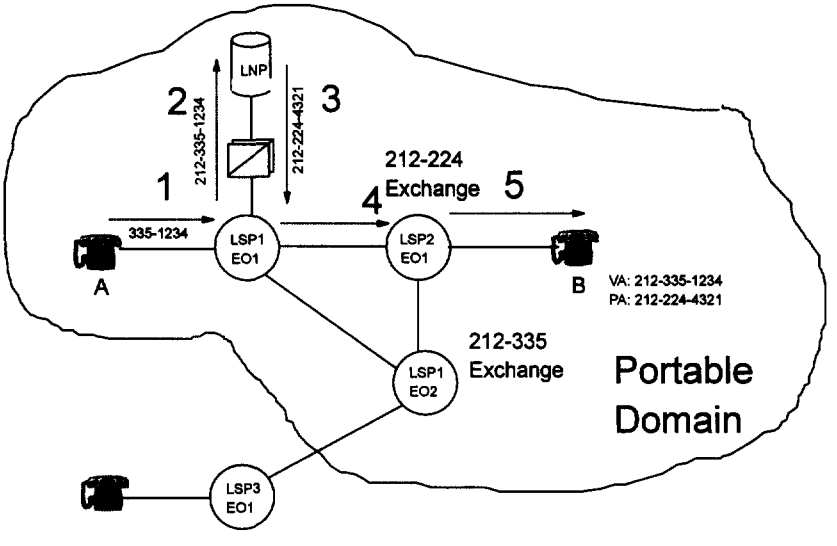

Figure 1: Calls Originating from Inside Portable Domain

The following describes the call flow associated with calls originating within the PD:

1) Customer A dials the 335-1234 Virtual Address(VA)

2) LSP 1 EO 1 recognizes that the 335 -1234 number is ported and sends an SS7 query to the local TNP SCP.

3) The LNP[16] translates the VA 212-335-1234 number to the PA 212-224-4321 and returns this to the LSP 1 EO 1.

4) LSP 1 EO 1 routes the call, based upon the PA, to LSP 2 EO 1, the 224 exchange. LSP 2 EO 1 receives the call.

5) LSP 2 EO 1 determines that the called party's address is a PA local to this switch and hence terminates the call to subscriber B (VA 212-335-1234, PA 212-224-4321).

Figure 2 below illustrates the call flow for calls originating outside of the PD. Calls could arrive from an LSP within the metropolitan area from a non-participating LEC, or from an IXC.

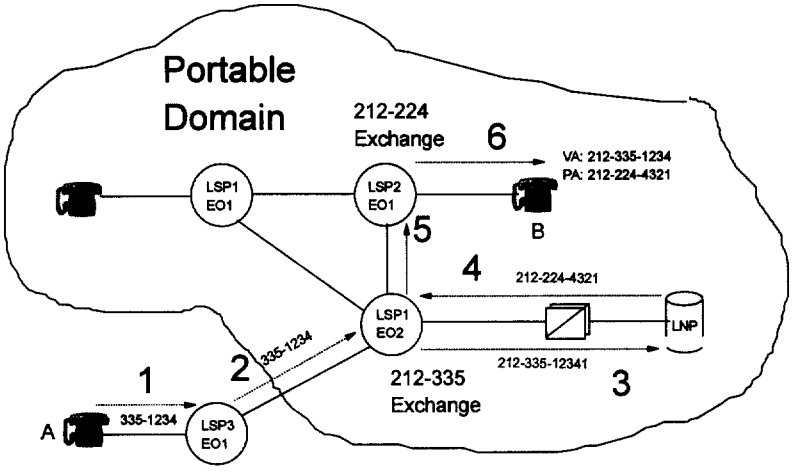

Figure 2: Calls Originating from Outside Portable Domain

1) Customer A dials the 335-1234 Virtual Address (VA).

2) LSP 3 EO 1 routes the call, based on the VA 335-1234, to the 335 exchange (LSP 1 EO2).

[16] LNP stands for Local Number Portability. LNP is used interchangeably in these comments with "local TNP SCP".

3) LSP 1 EO 2 recognizes that the received number is ported and sends an SS7 query to the LNP.

4) The LNP translates the VA 212-335-1234 number to the PA 212-224-4321 and returns this to the LSP 1 EO 2.

4) LSP 1 EO 2 routes the call, based upon the PA, to LSP 2 EO 1, the 224 exchange.

5) LSP 2 EO 1 receives the call.

6) LSP 2 EO 1 determines that the called party's address is a PA local to this switch and hence terminates the call to subscriber B (VA 212-335-1234, PA 212-224-4321).

Generally, each user with a ported number will have a service profile manager[17] which will be accessed on every call, whether originating or terminating. When a call is originated, a dip is made to the calling party's service profile manager which returns information, such as a designated IXC carrier identification code (CIC) and the calling party's VA. A dip is then made to the called party's service profile manager to determine the called party's routing preference (e.g. the current PA, if ported) based upon ANI (Automatic Number Identification) information and time-of-day, and potentially many other criteria as the variety of services proliferate. In some cases, these two dips may be combined into a single dip, such as where the same SCP is serving both the calling and called parties. Or, if either the calling or called party's number is not ported, the dip associated with that user would not (necessarily) be required. These efficiencies are in keeping with the common requirement that any TNP solution should be implemented so that the number of SS7 transactions (the dips) will be minimized.

[17] A service profile manager is an SCP which is very much like a cellular HLR, and which stores customer information for call processing based on customers' individual preferences and applicable services.

Stage 2

As Stage 1 matures, the increasing number of ported numbers and switches, together with capacity limitations of SSPs, will strain available resources.[18] When this approach becomes too difficult to manage, Stage 2 may be implemented by modifying the Stage 1 ten digit translation approach to one based upon translation of the 6 digit NPA-NXX.[19] At the same time, a new class mark (Service Provider ID or "SPID") is introduced in the SS7 signaling protocol[20] to indicate whether or not the number has been dipped. The SPID class mark in the SS7 message substitutes the necessary intelligence which, in Stage 1, will have been supplied by the last four digits in the NPA-NXX-XXXX. The first portable switch to dip to the TNP SCP will return the SPID class mark indicating that the call has been "dipped", and therefore signaling to downstream SSPs that another dip is not necessary because it has already been performed. The first point in the call path at which the SPID shows "dipped" will signify that the number returned in the SS7 message

[18] The Stage 1 scenario in which each switch recognizes all 10 digit NPA-NXX-XXXX numbers which have been ported will test the capacity of existing SSPs as the number of ported customers grows.

[19] Unmodified, this Stage 2 six-digit NPA-NXX look-up approach carries two significant drawbacks: 1) since a per line address AIN trigger is not available in the SSP to determine whether to dip or not to dip, unnecessary dips for calls to unported numbers within a ported NPA-NXX will occur (with a "Continue" message returned to the SCP for unported numbers) and 2) all AIN SSPs downstream will dip. This will happen since either the specific NPA-NXX-XXXX is unported (but downstream SSPs will have the NPA-NXX denoted as ported) or the NPA-NXX-XXXX will be translated to another portable SSP (in which case downstream SSPs will have the new NPA-NXX denoted as ported). If there were an indicator which allowed downstream switches to know whether a dip had occurred, we could eliminate the both classes of unnecessary dips. One could use incoming trunk groups to determine whether to dip (call from a non-ported SSP) or not to dip (call from a ported SSP). However, in an area with a mixture of ported and unported switches, this scheme is unreliable. Furthermore, business reasons may preclude a ported SSP from dipping for a particular NPA-NXX.

[20] The Initial Address Message (IAM) is the SS7 message to which ITN proposes to add the SPID class mark.

represents the Physical Address to which the call will be terminated.[21] As long as the SPID shows "undipped", a subsequent switch may potentially query an SCP, or the call will continue to be routed based on the dialed digits. The dialed number may be either virtual or physical, or both. If the call path does not encounter a ported switch, it doesn't matter, since the call will be routed through non-ported switches based on the dialed digits, as has traditionally been the case in non-ported domains. The call flows are the same as shown in Figures 1 and 2, with the exception that the switch dips the local TNP SCP based on the 6 digit NPA-NXX rather than the whole ten digit number.

A key benefit of this method in Stage 2 is that the virtual address domain and physical address domain can be shared. Thus, the PAs of ported VAs can immediately be re-used, maximizing the existing available numbering resources. Furthermore, adding the SPID class mark to the SS7 message at the first ported switch in the call path eliminates unnecessary subsequent SCP dips by signaling "dipped" calls to downstream switches. Finally, since "undipped" calls continue to be routed based on the dialed digits, this method does not impact non-ported switches. In Stage 2, the same number can now be either in a ported domain, an unported domain, or both.

Stage 3

Stage 3 marks the consolidation of local TNP domains, up to and including a fully interoperable national system. Wherever this consolidation is in effect, telephone numbers can

[21] Note that Stage 2 as proposed here is essentially the same as the Electronic Lightwave Inc./U. S. Intelco (USIN)/Stratus solution being tested in Washington and Rochester, NY. In Stage 2, the addition of a "number ported" class mark in the SS7 protocol suite allows for the sharing of NPA-NXX-XXXX numbers across both the ported domain and unported domain. The "number ported" class mark also helps minimize unnecessary SCP dips in call routing. This will ease administration of the transition to national TNP.

be ported anywhere within the consolidated TNP domain. This infers that any telephone number can be assigned to any switch within such a domain. Hence, as from the beginning of Stage 1, to ensure efficient network use, the first portable (AIN-equipped) SSP--ideally the first switch encountered--should query the appropriate local TNP SCP to determine the Physical Address of the called party.

Figure 3 below represents the call flow which results in ITN's Stage 3 approach to TNP.

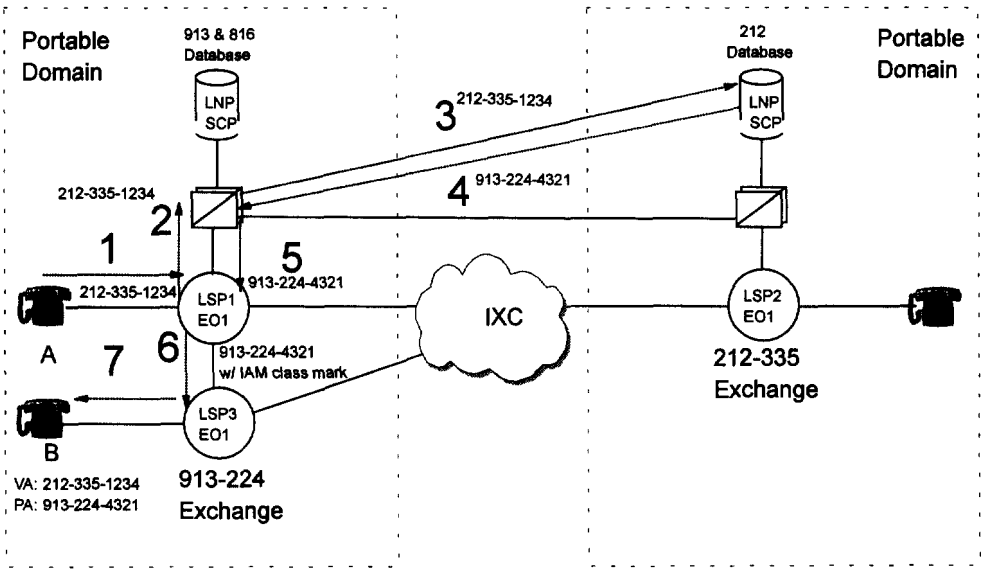

Figure 3: ITN's Stage 3 TNP Implementation

1.) LSP1 EO1 sends an SS7 query to the STP.

2.) The STP performs a GTT on the dialed 212-335 NPA-NXX

3.) The STP directs the query to the 212-335 LNP SCP.

4.) The LNP SCP translates the number to the 913-224-4321 number and returns this to LSP1 EO1.

5.) LSP1 EO1 then routes the call to LSP3 EO1.

6.) Included in the IAM is the class mark signaling "dipped" and indicating the number representing the Physical Address (PA).

7.) LSP3 EO1 then completes the call to the PA, 913-224-4321.

As indicated in Table 1 below, various Stages of ITN's approach can co-exist among local TNP domains throughout the nation. Each Stage relies upon the use of Bellcore's Advanced Intelligent Network (AIN) 0.1 Info_Collected and Info_Analyzed Trigger Detection Points (TDPs).[22] Standard AIN triggers are used at the portable SSPs for triggering to the SCP. ITN proposes the use of the Info_Collected trigger detection point to translate the Physical Address to the Virtual Address for calls originating from ported customers and the Info_Analyzed trigger detection point to translate the VA to the PA for calls to ported customers.

[22] See Bellcore document TR-NWT-001284.

Table 1

Stage 1	Parsed Database Structure Dip First Ported Switch	Can co-exist with Stage 2 and/or Stage 3.
Stage 2	Parsed Database Structure Dip First Ported Switch Service Provider SS7 Classmark	Can co-exist with Stage 1 and/or Stage 3.
Stage 3	Parsed Database Structure Dip First Ported Switch Service Provider SS7 Classmark Consolidated Portable Domains	Can co-exist with Stage 1 and/or Stage 2.

Full implementation of Stage 3 means the consolidation of all local TNP domains into one seamless national TNP domain--the culmination of ITN's proposal--is illustrated in Figure 4. To seamlessly transition from various independent local TNP domains, a national signaling/control infrastructure will be required. This control plane is represented in the upper half of Figure 4. This infrastructure must be implemented with the appropriate Global Title Translations to allow any SSP to access any TNP database within the portable domain.

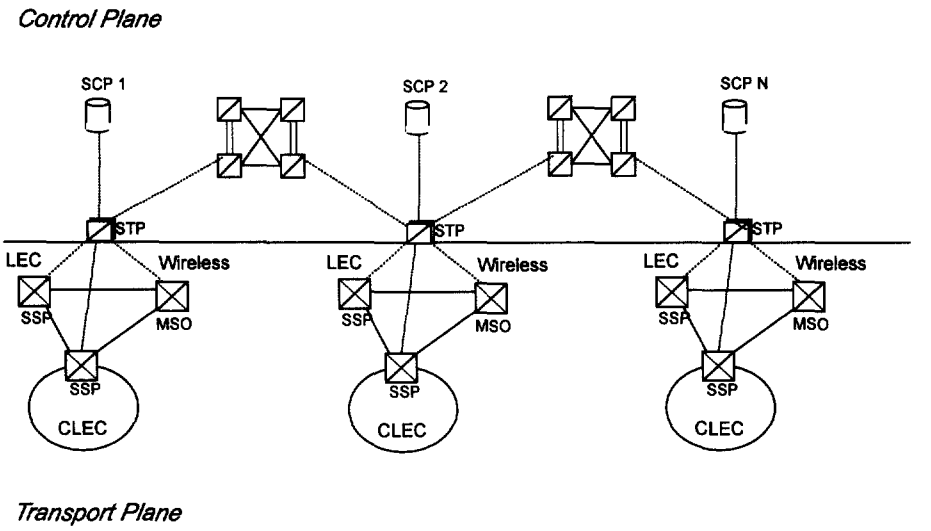

Figure 4: Control and Transport Planes of Consolidated Local TNP Domains

In national TNP, each call requires a maximum of two dips: one for the calling party and one for the called party. Figure 5 below shows the double dip. The calling customer has a physical address 408-777-7777 on the local SSP.

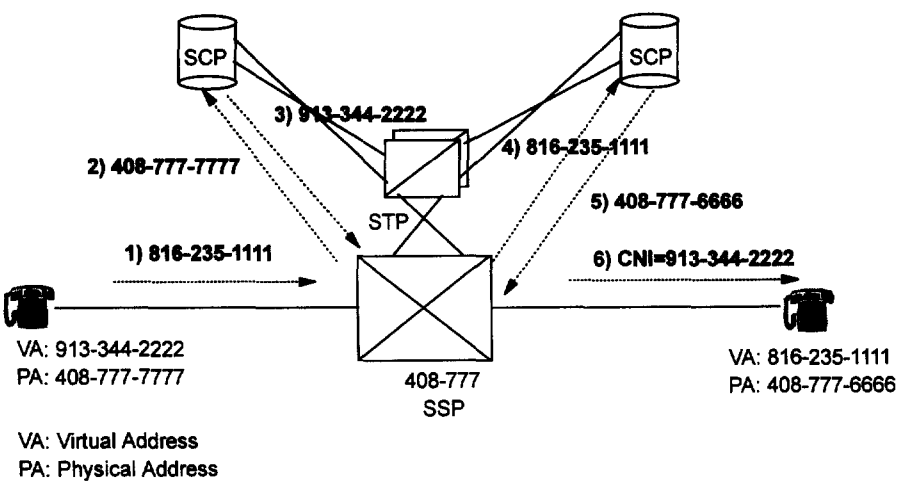

Figure 5: Maximum of Two Dips

[1] When a call is placed, [2] the first dip goes to the 408-777 SCP, and [3] returns the virtual address 913-344-2222. (This address is used by the rest of the world to call this customer, i.e. the calling party's directory number, or "VA".) [4] A second dip is made to convert the 816-235-1111 Virtual Address [5] into the 408-777-6666 physical address [6] allowing the network to route the call to the called party. This scenario assumes that the calling and called parties are both ported. If the calling party is not ported, a single dip will suffice for the call, namely, to route to the correct called party.

2. Limitations in Staged Implementation. While ITN's proposal allows for implementation in up to three sequenced stages, there are certain limitations to implementing TNP in stages. The following summarizes factors to be weighed in choosing to implement TNP in sequential stages, rather than mandating implementation all at once.

During Stage 1, the PA's of ported numbers cannot be re-assigned for use. The inability to re-use the Physical Address negatively implicates efficient use of the numbering resources as long as a domain remains in Stage 1. During the initial local deployment of TNP, however, the amount of ported numbers will be small. Therefore, given the reasonably imminent implementation of Stage 2, the negative impact should be insignificant. In any case, it will immediately be alleviated, and its effect on the numbering resource reversed, when the new SS7 class mark is introduced in Stage 2. The SS7 Class mark will also help minimize the number of necessary dips.

Before the completion of Stage 3, various TNP domains will exist as "islands", i.e. not consolidated into one national TNP domain. The attendant inefficiencies (e.g. double-trunking) will make it impractical to allow end users to port their numbers between these un-consolidated

TNP domains. ITN suggests, therefore, that there is substantial value in achieving full Stage 3 implementation as soon as possible.

C. Cost Considerations

There are four basic cost elements associated with number portability: costs associated with SSPs, STPs, and SCPs, and costs associated with data management.[23] If local TNP solutions are implemented in the fashion outlined in these comments (first portable switch dips and the databases are structured in the parsed manner), the costs to the local TNP infrastructure to evolve to a national system will be minimal. The SSP will need to update its AIN database to recognize the need for additional queries (to other NPA databases) and the STP will need to have the Destination Point Code entered into it's database for the new portable NPA for Global Title Translation (GTT). Both of these types of events are administrative, and very much like the relatively inexpensive administrative modifications performed today in STP and SSP update procedures. The local TNP SCPs should not be significantly impacted.[24]

D. TNP for Wireline and CMRS Markets

The question of TNP should be answered for landline and CMRS markets together. If attention is initially given only to the landline market, then the Commission will clearly be faced with the need to revisit the issue for CMRS in the near future. It is instructive to note that the CMRS market already provides service mobility in a highly effective manner using an

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[23] Numerous technical and business variables surrounding data management systems methodology make it extremely difficult to substantially comment here.

[24] The originating SSP and STP will experience additional SS7 traffic load since additional queries are being made. However, the terminating local area SSP and STP will have equal and offsetting reduction in SS7 traffic. The local TNP SCPs should be unaffected, since the difference is which SSP dips the SCP, not whether the dip occurs.

HLR/VLR[25] architecture. Conceptually, ITN's proposed number portability architecture is much like that used in CMRS today, in that the calling and called parties' switches (called MTSOs[26] in the CMRS world) query databases (the HLR/VLRs) in order to obtain the necessary call routing information. Indeed, over time it is expected that wireline and wireless services will converge resulting in a single customer service profile manager controlling their communications services independent of the technology used or the location.

If question of TNP for CMRS issue is deferred, the risk is that, in the best scenario, expensive retrofitting (massive deployment of new generic software releases and new hardware), will be required to consolidate the portability of these two types of domains. In the worst scenario, joining various disparate TNP systems together into one interoperable domain may be found to be practically impossible. Therefore, ITN strongly recommends that national number portability standards contemplate full compatibility of wireline SCP architecture with wireless HLR/VLR architecture.

E. Parsed Database Control Plane Architecture Creates Options in Data Management

As local TNP SCPs are created around NPA-NXXs, the GTT table entries at the STP will be updated to allow any ported switch to dip any existing local TNP SCP.[27] In keeping with the

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[25] HLR/VLR are acronyms from the CMRS world which refer to SCP-like databases called Home Location Registers and Visiting Location Registers, which are used for wireless call routing and other signaling functions. HLR/VLR databases reside on platforms which are increasingly resembling Service Control Points, particularly with IS-41 Rev. B, and even more with Rev. C.

[26] MTSO stands for Mobile Telephone Switching Office.

[27] The STP receives the SS7 message containing the called (and/or calling) number and, through GTT, determines to which SCP the SS7 message is destined. The network identity of the chosen SCP is called the Destination Point Code (DPC).

objective to allow existing routing methods to be used, any TNP implementation should contemplate updating the SS7 signaling control plane elements in this manner.

Current STPs are limited to approximately 64,000 GTT table entries, depending on the STP vendor. While STP capacity will increase with technological advances, this limitation has a profound impact on TNP control plane architectures. Since the number of GTT table entries is limited, the number of telephone numbers which can be ported is also limited. If initial TNP deployments allow any ported telephone number to be located in any SCP, then GTT table entry capacity required for TNP could grow, over time, to be on the order of 150 million (the number of telephone numbers). This is because the STP would have to be able to perform ten digit analysis, and since every number could be anywhere, every number would have to be stored in every STP. Even with only one percent (1%) of the numbers ported, current STP capacity would be inadequate.

A carefully architected control plane database structure is required to limit GTTs to three- or six digit translations. ITN's approach assumes that numbers will be located in SCPs based upon their NPA (or in some cases NPA-NXX). All numbers in these given blocks will be stored in the same local TNP SCP. When a call is placed to a given NPA (or NPA-NXX), a dip is performed by the first SSP capable of performing the dip (ideally, the first switch in the call path) to the SCP which stores the NPA block. If ITN's approach is adopted, local TNP SCPs will initially be deployed in such a manner, so that they can easily be transitioned to an interoperable national system. By distributing local TNP SCPs (or corresponding sets of SCPs) where each covers a unique local area, the SCP is uniquely identified by the set of NPA-NXXs contained in it. At the highest level, the SCP could be considered the local TNP SCP for each NPA. At the upper end of the estimated range, slightly less than 1000 SCPs would be required to store the

translations for all numbers. Combining NPAs within an SCP is also an alternative early on, and would correspondingly reduce this estimate. In Stage 1, each local TNP SCP will house the VA to PA address mapping for all VAs with the associated SCP NPA, and the PA to VA address mapping for those ported customers which are physically located within the geographical area defined by the NPA. In Stage 2, this association is removed. Each TNP SCP stores the VA to PA mapping translation, but the VAs stored in the SCP are independent of whether the calling or called party physically resides in the geographical area commonly associated with that NPA. Such SCPs could be owned and/or operated by any competitive service provider.

This highly distributed data control plane architecture begins its development by the storing of Virtual Addresses of customers geographically located within the local area; but later the relationship between the SCP and the location of elements in the PSTN, i.e. the traditional incumbent service provider facilities, is severed. In other words, the traditional tie between the SCP and the local service provider has been eliminated. This will set the stage for the SCP service provider to competitively access and serve end users.

Thus, ITN's proposal contemplates multiple options for data management functionality. Local service providers may be presented with the option to maintain and manage the service profiles and records of their own customers, or, alternatively, have a 3rd party provider perform such functions. Openness in data management can help insure service provider portability at all levels, including end user service providers and various other Intelligent Network service providers.

ITN suggests that the options in deploying data management functionality can provide for the same degree of competition as in physical end user service. ITN's approach contemplates

the capability to deploy highly distributed data management functionality.[28] This flexibility can help avoid "bottleneck" physical access to the end users. Access to end user records in a TNP environment[29] is just as essential as access to the end user's physical and logical network addresses. All three aspects together will comprise the essential level of access necessary for any worthy service provider to have the opportunity to compete effectively.

In short, implementation of ITN's proposal will help obtain the objective to avoid favoring one group of service providers over another, through implementation of a highly distributed control plane database architecture, which contemplates a variety of options for distributed TNP data management.

III. CONCLUSION

ITN proposes a method for the migration to a national TNP system in which the first switch performs the SCP dip, a new SS7 class mark indicates when a call has been dipped, and the signaling control plane infrastructure is based on an infinitely scaleable parsed database structure. These principles are proposed without assumptions about the roles of any potential competitive service provider.

ITN's approach minimizes the number of required database dips. It avoids impacting non-portable switches, incorporates current network routing methods, and contemplates the efficient use of available network resources. The distributed control plane database architecture

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[28] Compare, for example, the 800 Database Service Management System (SMS), which is an example of centralized data management system.

[29] Access to end user records are essential to those who would compete in any AIN telecommunications marketplace, because the end user will have control over preferences through the ability to change an ever growing list of parameters stored in these records. Thus, mass customization will replace mass production in the telecommunications industry.

efficiently allows local TNP implementations to be migrated to a seamless, interoperating national system. With a model similar to that successfully deployed in CMRS today, this infinitely scaleable parsed database structure creates options for the deployment of data management functionality.

ITN submits this proposal in order to assist the Commission to the extent that the Commission exercises its jurisdiction to establish an economically feasible transition to a seamless national Telephone Number Portability system.

Respectfully submitted,

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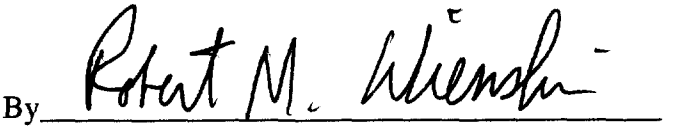
By 

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